

ALL-IN-ONE PROPHY ANGLE

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BACKGROUND OF THE INVENTION

This invention relates to dental prophylactic (prophy) angle handpieces, prophy cups, and prophy polish for professional cleaning of teeth.

Rotating prophy cups are generally used to carry and apply prophy paste to the teeth. The prophy paste is comprised of an abrasive, a binder, and a liquefying agent which is used to create a flow of the paste. The prophy cup functions by carrying the prophy paste to the surface of the teeth and the cup material polishes all surfaces of the teeth, including subgingival and interproximal surfaces. Typically the prophy cup picks up the paste by dipping the cup in a reservoir of paste. As the cup is rotated by the prophy angle, the prophy paste exits the cavity and is applied to the tooth. The paste acts as both a lubricant and an abrasive.

Due to the centrifugal rotation of the prophy cup the pumice quickly exit exits the cup and splatters throughout the mouth and on the patient and operator, increasing the risk of cross contamination. Prophy cups have been designed in an attempt to slow down the exiting of the prophy paste. The prophy cup must be repeatedly reloaded, which is time-consuming. Prophy handpieces have been designed to deliver continuous supply prophy paste thus eliminating the need to refill the the prophy cup, but do not allow the operator to quickly vary the flow of paste as needed and does not eliminate the splatter problem. A prophy handpiece named the Twist TM Pat. No. 6,409,507 has been designed to reciprocate 90 degrees rather than to rotate. The Twist TM claims to produce faster prophys, and no tearing or cutting of soft tissue and no frictional heat. The Twist TM represents a reasonable attempt to control splatter, but the reciprocating motion is not as efficient as the rotary motion at polishing teeth and does not deliver a continuous supply of prophy paste.

SUMMARY OF THE INVENTION

The present intervention is directed towards a solid core prophy paste to be used in cleaning teeth. Also included are a dental prophy angle and a prophy cup. The prophy cup is comprised of a longitudinal cylindrical body with an interior and exterior, a rear and front end, the rear end contains a shaft which connects to the prophy angle. The prophy cup front end has a circular polishing edge. Adjacent to the polishing edge, towards the body interior, is a circular retaining edge. Contained within the interior of the

body of the prophy cup is the longitudinal solid core prophy paste with circumferential circular rings which are at right angles to the prophy paste's long axis. The solid core prophy paste has a front end which engages the tooth and a second end with an end plate which engages a disc or piston which is fitted to the interior of the body of the prophy cup and is positioned vertical its long axis. Positioned between the body second end and the piston is a longitudinal spring which supplies a continuous dispensing pressure against the solid core prophy paste. The solid core prophy paste is retained within the interior of the prophy cup by the circular retaining edge which engages the an annular groove of the solid prophy paste. At rest the dispensing force of the spring is countered by the holding force of the retaining edge and the solid core prophy paste is held in place. As the prophy cup is pressed against the tooth surface the annular retaining edge increases in circumference, which releases the retaining edge from the prophy paste circular ring, which allows the spring to push the paste against the tooth surface, which dispenses the paste during the prophylaxis of the patients teeth. The patient is asked to rinse prior to the prophy which supplies moisture to the tooth surface and rotation of the prophy cup dispenses the prophy paste. The harder the prophy cup is pushed against the tooth surface the quicker the paste is dispatched. The pressure of the tooth against the solid paste counteract the force of the spring and retains the paste within the prophy cup. Pressure against the tooth dispenses a consistent amount of paste on the tooth. There is no splatter of the prophy paste and the prophy angle may be kept in the mouth from start to finish continuously. The result is minimal, if any, splatter, which reduces cross-contamination and results in a reduction of operating time.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view of the prophy cup and angle mounted to a dental handpiece;

FIG. 2 is a x-sectional view of the prophy cup containing the prophy paste;

FIG. 3 is a x-sectional view of a preferred embodiment off the all-in-one prophy angle;

FIG. 4 is a x-sectional view of a preferred embodiment off the all-in-one prophy angle; and

FIG. 5 is a x-sectional view of a preferred embodiment off the all-in-one prophy angle.

DETAILED DESCRIPTION OF THE INVENTION

Referring to **FIG.1** a prophy cup **1** is shown attached to a prophy angle dental handpiece **2** which is then attached to a dental handpiece **3**. The dental handpiece **3** provides rotating power to the prophy angle **2**

which in turn rotates the proph cup 1. The proph cup is used in combination with a proph polish in cleaning the teeth. In **FIG 2** a preferred embodiment of the invention is shown comprising a proph cup 1 containing a solid core proph paste 11.

The proph cup 1 of the present invention is shown in **FIGS. 1-5**. The cup 1 is made of a pliable elastomeric material having a durometer hardness of about 42 to about 70. Preferably the cup 1 is made of a natural rubber or polyisoprene containing a small amount of abrasive. The preferred abrasive in the proph cup 1 is medium and fine grade pumice. Other abrasives can be used such as hard minerals (Mohs hardness 5 to 9) and softer minerals, such as phosphates (Mohs hardness below 5).

Depicted in **FIGS. 1-5** the dental proph cup 1 is comprised of a cylindrical body 12 with a longitudinal axis having a rear mounting portion 13 and a front polishing portion 14. The front polishing portion 14, shown in **FIGS. 2-5**, includes a front surface which defines a skirt which slopes outwardly towards the front, the diameter of the bottom skirt being greater than the top of the skirt. The top of the skirt defines an annular retaining edge 15 which retains the solid core proph paste 11. In **FIG. 2** the body 12 of the proph cup 1 is defined by a wall 16 with an inside and an outside. In **FIG. 2** the inside wall is smooth and encloses the solid core proph paste 11 which has the same axial longitudinal direction as the proph cup body 12 of the proph cup 1 and is positioned at the front edge of the inside of the body 12 of the proph cup 1. Located within the inside of the body of the mounting portion 13 is a force means which applies pressure on the solid core paste 11 which dispenses the paste 11 towards the surface of the tooth 8. In **FIGS. 1 and 5** as the front polish in the front polishing portion 14 of the proph cup 1 is pressed against the tooth surface 8 the front polishing portion 14 stretches into a larger diameter which also stretches the retaining edge 15 into a larger circumferential diameter which releases the retaining side 15 from the corresponding solid core groove 18. The result is the solid core paste 11 is pressed against the tooth surface by the rear force means 21 and the rotation of the proph cup 1 releases the proph paste 11 at a uniform rate. When no loads are placed against the tooth 8 the solid core proph paste 11 is retained within the proph cup 1.

In preferred embodiments in **FIGS. 2-5** the pressure produced against the solid core proph paste 11 is produced by an internal spring 21 at the rear end of the proph cup 1. The spring pressure is applied to a circular piston 22 which in turn transmits the pressure to the solid core proph paste 11.

FIG. 2 is a preferred embodiment wherein the proph cup 1 and the wall 16 are integral forming a proph cartridge which internally contains the spring 23, circular plate 22, and solid core proph paste 11.

The rear portion **13** of the cartridge contains an annular drive gear **36** which connects to a prophy angle drive gear **35**. The prophy angle drive gear **35** has a cup fitting **39** which locks the prophy cartridge in place. In this preferred embodiment the prophy angle **2** is disposable.

In **FIG. 3** is another preferred embodiment. The mounting portion **13** is hollow with a 2-4 mm. internal open diameter. The piston **22** is located adjacent to the rear end. The front end of the shaft **17** is a bulbous ball **38** which the prophy cup **1** is fitted and attached to. The prophy cup **1** and the solid core prophy paste **11** may be replaced.

In **FIG. 4** is another embodiment wherein the means to extrude the solid core prophy paste **11** is liquid or air delivered by a rotational paddle **28** within the prophy angle **2** which delivers the force to the piston which in turn moves the solid core paste **11**.

In **FIG. 5** is another preferred embodiment wherein the prophy handpiece **2** has an internal cavity which contains a prophy cartridge **38** comprised of metal or plastic which internally contains the wall **16** of the prophy cup **1**. The wall of the prophy cup **1** fits the internal wall of the prophy cartridge **38**. The end wall of the prophy cartridge **38** contains an internal screw **31** which fits into a female screw hole **32** of the prophy cup **1**. The prophy cup **1** has an internally contained spring **23** which dispenses the solid core prophy paste **11** towards the tooth surface **6**. In this embodiment the prophy cartridge **38** is mounted within the prophy angle **2** with bearings **33** and a drive mechanism. The drive mechanism is comprised of an annular gear **36** attached to the outer circumference of the prophy cartridge **38** which engages with the prophy angle **2** drive gear **35**. The entire prophy cartridge **38**, containing the prophy cup **1** and solid core prophy paste **11** rotates during cleaning teeth. This embodiment allows for the largest amount of solid core prophy paste **11** and the replaceability of the prophy cup **1** containing the solid core prophy paste **11** by unscrewing the prophy cup **1** and screwing a new cup **1** on. This allows for the use of a second prophy cup **1** with paste **11** and also allows for a sterilizable re-usable prophy angle **2**.

The solid core prophy paste **11** is comprised of a dental abrasive from a group consisting of pumice, clay, and diatomaceous earth with curing systems such as sodium silicate (3-4 parts)and methyl salicylate (0.24- 1.25 parts). The dental abrasive value (RDA), using the Hefferen method, should be above 200.